PA NT COOPERATION TREAT

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing: 18 January 2001 (18.01.01)	
International application No.: PCT/SE00/01248	Applicant's or agent's file reference: 942/PCT
International filing date: 15 June 2000 (15.06.00)	Priority date: 08 July 1999 (08.07.99)
Applicant: ANDERSSON, Magnus et al	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International preliminary Examining Authority on:

08 November 2000 (08.11.00)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer:

J. Zahra

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PCT

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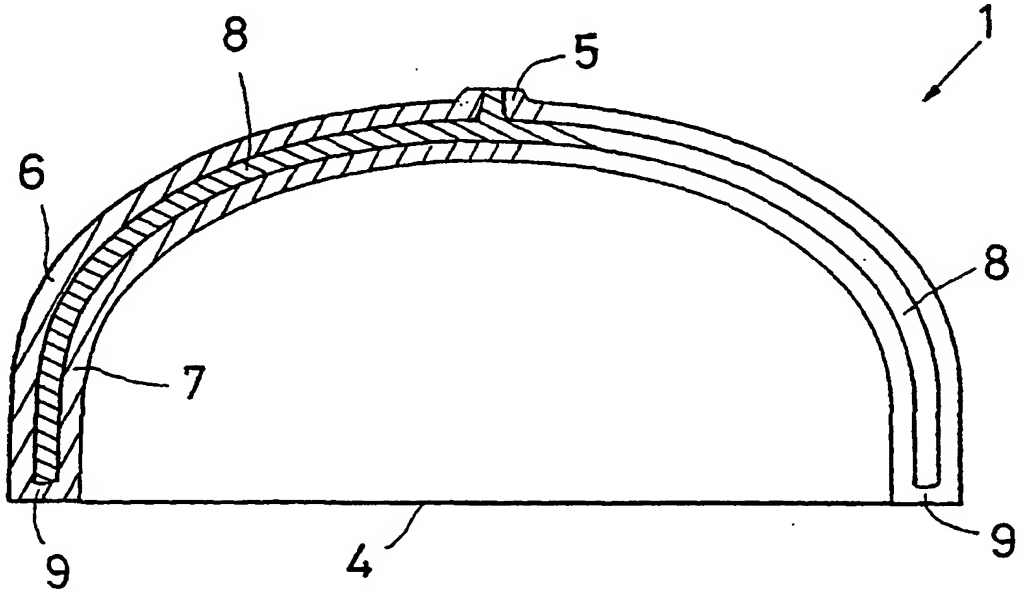
(81) Designated States *(national)*: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DE (utility model), DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *With international search report.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: A METHOD OF PRODUCING A HOOD, AND A HOOD PRODUCED ACCORDING TO THE METHOD



(57) Abstract: The disclosure relates to a method of producing a hood for a hearing protector by injection moulding of plastic material. The hood (1) is injection moulded to a single contiguous piece employing at least two plastic materials possessing different properties in at least one respect. The plastic materials may be both homogeneous and in porous or foamed form. A hood (1) for a hearing protector is produced from plastic by injection moulding. The hood (1) includes at least two portions or layers (6, 7, 8; 10, 11; 13, 14) which are united to one another. The portions or layers (6, 7, 8; 10, 11; 13, 14) consist of plastic materials with different properties in at least one respect.

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A METHOD OF PRODUCING A HOOD, AND A HOOD PRODUCED ACCORDING TO THE METHOD

TECHNICAL FIELD

The present invention relates to a method of producing a hood for a hearing protector, the hood being produced by injection moulding of plastic material.

The present invention also relates to a hood for a hearing protector in which the hood is produced from plastic by injection moulding.

BACKGROUND ART

A multiplicity of various acoustic hoods are previously known in the art for use in hearing protectors. Such hoods may be simple and consist of a cup-shaped shell injection moulded from plastic which is secured in one end of an arc which is placed over the head of the wearer and which has a similar hood at its opposite end. The hoods are dimensioned to enclose the wearer's ears.

A hood consisting exclusively of a shell is, despite quite complicated configuration, readily subjected to vibrations and oscillations, throughout the entirety of the hood or only locally in it, which implies that the sound-suppression or sound insulation which the hood achieves will be unpredictable and uneven within various frequency ranges.

In order to obviate the above-mentioned problem, various inlays of different sound-absorbing materials have been placed interiorly in the hood. Such solutions also suffer from similar drawbacks.

EP 484 306 discloses a hearing protector in which the hoods have a hard outer shell, inside this a casing of compressed foamed plastic, and inside this casing a further hard hood, which realises compression of the foamed layer lying outside. Interiorly in the inner hood, a sound-absorbent material is then placed.

Such a construction functions considerably better than the above-described construction consisting merely of a shell which is provided interiorly with a sound-absorbent. However, the construction is not optimal, either as regards rational production or sound-suppression/sound-insulation.

Similar constructions are also known from USPS 2 684 067, DE 3 441 120, DE 3 441 122, and others.

For a hood to be as favourable as possible in a hearing protector, the material in the hood should be "as dead as possible" so that it has a very slight ability to be excited into oscillation movements both as an entity and also locally.

PROBLEM STRUCTURE

The present invention has for its object to form the method intimated by way of introduction such that it is possible, according to the method, to manufacture a hood which obviates the drawbacks inherent in hoods according to prior art technology, and in particular to improve the sound-suppression capability of the hood. The present invention further has for its object to form the method such that it permits extremely rational production of hoods, at the same time as these can be given an extremely aesthetically attractive appearance.

The present invention also has for its object to design the hood intimated by way of introduction such that this obviates the drawbacks inherent in prior art designs and constructions, and in particular improves the sound-suppression capability of the hood. Finally, the present invention also has for its object to design the hood such that this may be manufactured economically and rationally in large series and that it may be given an aesthetically attractive exterior.

SOLUTION

The objects forming the basis of the present invention will be attained in respect of the method if this is characterised in that the hood is injection moulded to one

single continuous piece using plastic materials with different properties in at least one respect.

As regards the hood, the objects of the present invention will be attained if the hood is characterised in that it includes at least two mutually contiguous portions or layers which consist of plastic material with different properties in at least one respect.

By injection moulding of a hood where different portions are included in the hood, and where the injection moulded plastic material or materials have different properties in at least one respect, a hood will be realised which suffers from considerably less of a risk of being subjected to resonance oscillations both locally and for the hood as an entity. The hood will have improved sound-suppression capability.

Further, the possibility is afforded of extremely rational manufacture.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

The present invention will now be described in greater detail hereinbelow, with particular reference to the accompanying Drawings. In the accompanying Drawings:

Fig. 1 is a perspective view of a part of a hearing protector employing a hood according to the present invention;

Fig. 2 is a cross section through a first embodiment of a hood according to the present invention; and

Fig. 3 is a partial cross sectional, on a larger scale, of a second embodiment of a hood according to the present invention.

DESCRIPTION OF PREFERRED EMBODIMENT

The basic concept behind the present invention is that there should be included, in one and the same hearing protector hood, at least two portions where the material in each portion differs in one way or another as regards oscillation from the material in the other portion or in the remaining portions. Differences which will be topical for consideration here are differences in density, differences in hardness, differences in modulus of elasticity, differences in structure, for example differences between homogeneous and porous plastic materials, differences between plastic materials with open or closed foamed structure, differences between plastic materials with and without different types of fillers, etc. As examples of usable plastics, mention might be made of ABS plastic, polypropylene, polyethylene and polycarbon plastics, TPE, etc.

The concept which lies behind the present invention takes as its point of departure the fact that a sound wave, i.e. a mechanical oscillation movement, which propagates in a body will at least partly be reflected and refracted when it impinges on an interface between materials with different properties. The reflected and refracted parts of the sound wave will interfere with each other and with the original sound wave, with a diffusion and attenuation of the sound wave as a result. This phenomenon becomes more manifest the higher the frequency the sound wave has.

If one considers a body, e.g. a hood included in a hearing protector, its oscillation properties are determined by material properties, configuration and dimensions. Different materials oscillate at different frequencies if the remaining properties remain constant. If two bodies which oscillate at different frequencies (e.g. depending upon different material properties in the bodies) are mechanically interconnected, the different oscillations will inhibit one another, whereby resonances are obstructed or reduced.

In Fig. 1, reference numeral 1 relates to a hood included in a hearing protector, the hood being pivotally secured in a stirrup 2 which is intended to extend over the

head of the wearer of the hearing protector. On the side of the hood 1 facing towards the wearer's head, there is provided an abutment ring 3 which is produced from soft, resilient and yieldable material so that it may form itself according to the head of the person wearing the hearing protector, and thereby realise a seal between the interior of the hood, round the ear of the wearer and the ambient surroundings.

When the word "hood" is employed below and in the appended Claims, this refers exclusively to the hood proper without loosely inserted damping material or other equipment and also without the above-mentioned abutment ring.

In the embodiment according to Fig. 2, the hood 1 is produced by injection moulding in accordance with the sandwich method. The hood 1 has a peripheral edge 4 facing towards the wearer's head and along which the above-mentioned abutment ring 3 is secured.

On its outside, the hood 1 has a sprue 5 via which molten plastic material is injected in under high pressure into the mould in which the hood 1 is produced. According to the sandwich method, a first plastic material which is to form the outer casing 6 of the hood and its inner casing 7 is injected in first. When injection of this first plastic material is completed, the injection continues with a second plastic material which is injected interiorly in the material which formed the outer casing and the inner casing. The first and second plastic materials have different material properties in at least one respect, such as density, hardness, etc. The second plastic material forms an intermediate layer 8 between the outer casing 6 and the inner casing 7. It should be observed that the outer casing 6 and the inner casing 7 have a connecting bridge 9 along the peripheral edge 4 of the hood 1. As a result, the material in the intermediate layer 8 will in principle be totally enclosed between the outer casing and the inner casing, possibly apart from the region at the sprue 5.

On injection moulding according to the sandwich method, the plastic material for the outer casing and the inner casing is fed to the moulding tool via a first feeder

screw included in the injection moulding machine. A second feeder screw is employed for injecting the second material for the intermediate layer 8, in which event the tool may either have two separate inlets, one for each screw, or the tool may also be switched from a position for injection via the first screw to a position for injection via the second screw.

In the embodiment according to Fig. 1, the hood 1 has an outer, peripheral portion 10 which extends along the periphery of the hood apart from in its upper region. The bottom of the hood, i.e. substantially its central region, and its upper region are formed from a central portion 11 which is discrete from the outer portion 10 via a separation line 12 which, in practice, is only visual since the material in the outer portion 10 and the central portion 11 in principle form a single, contiguous piece where the different portions have materials with different properties.

In one variation of the embodiment according to Fig. 1, the outer portion 10 has a through-going material thickness such that the hood 1 has the same material externally and internally within the region which is defined by the outer portion 10. The corresponding feature naturally applies to the central portion 11.

In another variation of the embodiment according to Fig. 1, the material within the outer portion 10 is double, with an outer layer which has a free surface on the outside of the hood, and an inner layer whose material differs from the material in the outer layer. The corresponding applies to the central portion 11, but however the materials in the outer and inner layers have been reversed, so that the material in the outer layer of the outer portion lies on the inside of the central portion 11, while the material in the outer layer within the central portion 11 lies on the inside of the outer layer in the outer portion 10. In the region of the separation line 12, the layers have mutually corresponding apertures and bridges, which will be illustrated more clearly with reference to Fig. 3.

Fig. 3 shows a duplex layer construction where the division between the layers may have any optionally formed separation lines which can define considerably

more different regions than applies in Fig. 1, where only two different regions are shown.

In the embodiment according to Fig. 3, the shell 1 has, in its upper region in the Figure, a soft inner layer 13 and a hard outer layer 14. The two layers 13 and 14 are united to one another in a union interface where the materials have been caused to adhere powerfully to one another, possibly by fusion, during the injection moulding cycle proper. In the lower region of the embodiment according to Fig. 3, the soft material is outermost and forms an external band 13' along the peripheral edge 4 of the hood 1. On the inside of this external band 13', the hard material is located and there forms an inner band 14'.

The transition region between the edge area 16 of the hood 1 and its cupola area 17 includes alternatingly disposed bridges 18 and complementary apertures 19 accommodating the bridges 19.

As will be apparent from Fig. 1, an abutment ring 3 extends along the peripheral edge 4 of the hood 1. This has a carrier ring 20 with catches 21 or a circumferential ring for snapping into a groove 22 in the inside of the inner, hard band 14'. For the satisfactory function of the hearing protector, it is of vital importance that a good seal is obtained, on the one hand, between the interior of the hood 1 and the abutment ring 3 and, on the other hand, between the abutment ring 3 and the head of the wearer of the hearing protector. In the embodiment illustrated in Fig. 3, the outer, soft band 13' has been given the form of a seal 23 which abuts elastically compressed against the upper side of the carrier ring 20.

The division between the portions 10 and 11 of the hood 1 shown in Fig. 1 has been made merely for purposes of exemplification. Aesthetic considerations may be made in this design, without appreciably affecting the acoustic properties of the hood. On the other hand, it might possibly be expected that a division into more than two different contiguous portions may have a favourable effect on the acoustic properties of the hood.

WHAT IS CLAIMED IS:

1. A method of producing a hood for a hearing protector, the hood being produced by injection moulding of plastic material, **characterised in that** the hood is injection moulded to a single contiguous piece employing plastic materials with different properties in at least one respect.

2. The method as claimed in Claim 1, **characterised in that** plastic materials are employed in both homogeneous and in porous or foamed form.

3. The method as claimed in Claim 1 or 2, **characterised in that** at least two different plastic materials are employed.

4. The method as claimed in Claim 3, **characterised in that** plastic materials of different densities are employed.

5. The method as claimed in Claim 3 or 4, **characterised in that** plastic materials of different hardnesses are employed.

6. The method as claimed in any of Claims 3 to 5, **characterised in that** plastic materials with different modulus of elasticity are employed.

7. A hood for a hearing protector, the hood (1) being produced from plastic by injection moulding, **characterised in that** it includes at least two mutually contiguous portions or layers (6, 7, 8; 10, 11; 13, 14) which consist of plastic materials with different properties in at least one respect.

8. The hood as claimed in Claim 7, **characterised in that** the portions include an outer and an inner layer (6, 7, respectively) of a plastic material with a first group of properties and an intermediate layer (8) located therebetween and consisting of a plastic material with a second group of properties.

9. The hood as claimed in Claim 7 or 8, **characterised in that** the outer and inner layers (6, 7, respectively) are relatively hard, while the intermediate layer (8) is softer or has foamed structure.

10. The hood as claimed in Claim 7 or 8, **characterised in that** the intermediate layer (8) is relatively hard while the outer and inner layers (6, 7, respectively) are softer or have foamed structure.

11. The hood as claimed in Claim 7, **characterised in that** the portions include two material layers (13, 14), of which at least one has surfaces which are free towards both the outside of the hood (1) and towards its inside.

12. The hood as claimed in Claim 7, **characterised in that** the portions include two material layers (13, 14) which both have surfaces which are free towards the outside of the hood (1) and surfaces which are free towards the inside of the hood.

13. The hood as claimed in any of Claims 7 to 12, **characterised in that** at least one of the portions consists of a different plastic material than the other/others.

14. The hood as claimed in any of Claims 7 to 13, **characterised in that** a portion (13') is disposed along the peripheral edge (4) of the hood, is produced from a soft and elastic material, and is designed for sealing against the abutment ring (3) which is disposed along the peripheral edge (4) of the hood (1) and designed to abut against the head of the wearer of the hearing protector in which the hood is included.

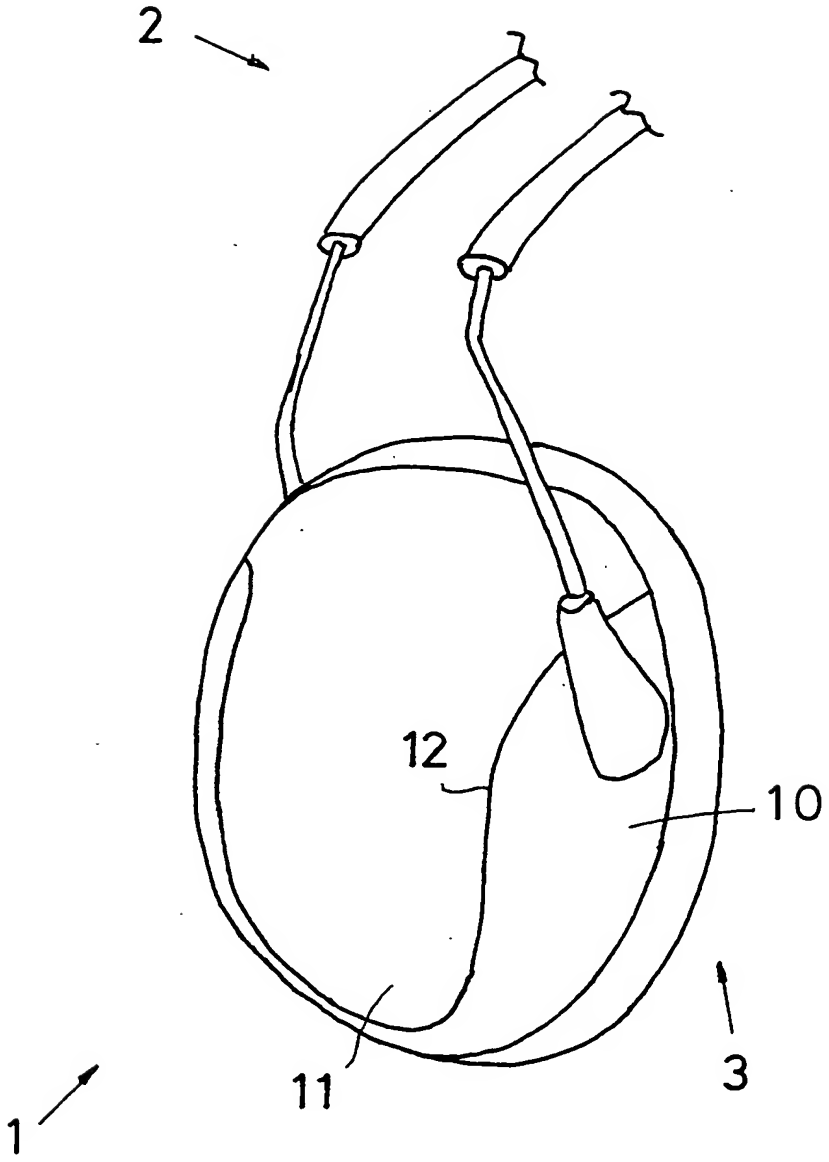

Fig 1

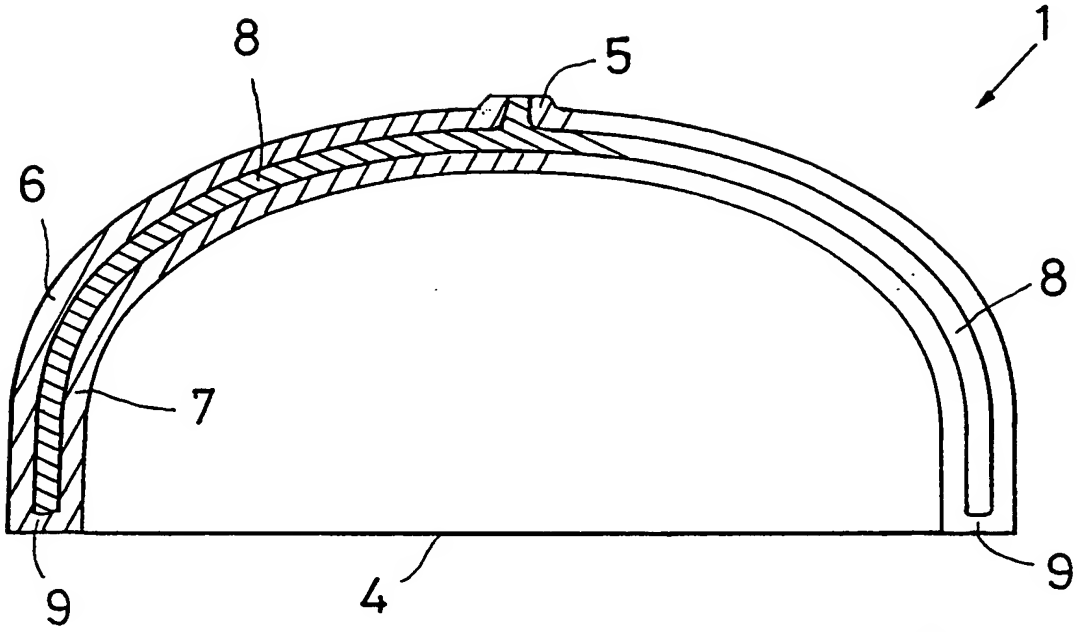

Fig 2

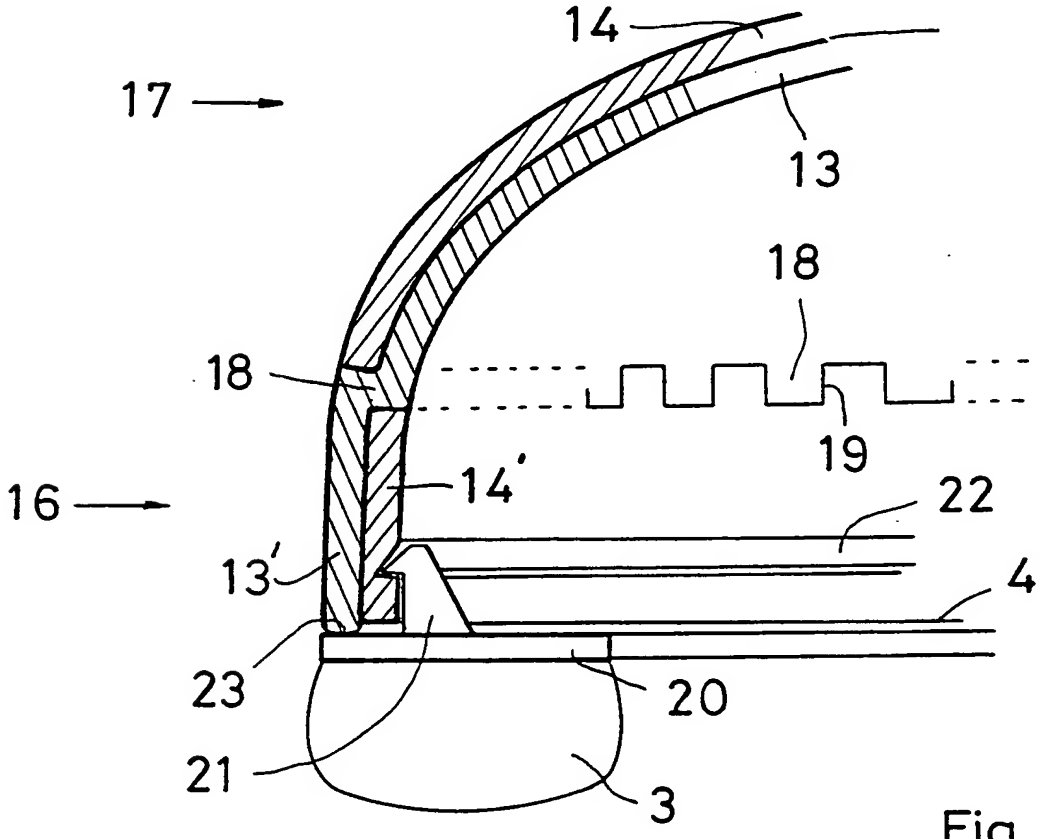

Fig 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 00/01248

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: A61F 11/14, A42B 3/16
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: A61F, A42B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9424185 A1 (CABOT SAFETY CORPORATION), 27 October 1994 (27.10.94), claim 1, abstract --	1-14
A	US 3875592 A (JACKSON A. AILEO), 8 April 1975 (08.04.75), abstract --	1-14
A	US 4471496 A (ROSS GARDNER ET AL), 18 Sept 1984 (18.09.84), abstract --	1-14
A	US 5023955 A (JOHN A. MURPHY ET AL), 18 June 1991 (18.06.91), abstract -- --------	1-14

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" erlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 October 2000	23 -10- 2000
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Mattias Arvidsson/ELY Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

Information on patent family members

01/08/00

International application No.
PCT/SE 00/01248

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9424185 A1	27/10/94	AT 181343 T	15/07/99
		AU 687393 B	26/02/98
		AU 6558194 A	08/11/94
		BR 9406473 A	23/01/96
		CA 2160870 A	27/10/94
		DE 69419145 D,T	05/01/00
		EP 0695315 A,B	07/02/96
		SE 0695315 T3	
		JP 2912017 B	28/06/99
		JP 9501069 T	04/02/97
		US 5420381 A	30/05/95
		US 5792998 A	11/08/98
US 3875592 A	08/04/75	NONE	
US 4471496 A	18/09/84	AU 559248 B	05/03/87
		AU 2990984 A	03/01/85
		BR 8402130 A	26/03/85
		CA 1222851 A	16/06/87
		DE 3423595 A,C	03/01/85
		FI 79771 B,C	31/10/89
		FI 841621 A	28/12/84
		GB 2142220 A,B	16/01/85
		GB 8414572 D	00/00/00
		IT 1176337 B	18/08/87
		IT 8421629 D	00/00/00
		NL 8401723 A	16/01/85
		SE 454840 B,C	06/06/88
		SE 8403071 A	28/12/84
US 5023955 A	18/06/91	NONE	

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

14

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
942/PCT		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/SE00/01248	15.06.2000	08.07.1999
International Patent Classification (IPC) or national classification and IPC7		
A 61 F 11/14, A 42 B 3/16		
Applicant		
Peltor AB et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 3 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
08.11.2000	11.10.2001
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Telex 17978 PATOREG-S Facsimile No. 08-667 72 88	Authorized officer Mattias Arvidsson/Els Telephone No. 08-782 25 00

Form PCT/IPEA/409 (cover sheet) (January 1998)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/SE00/01248

I. Basis of the report

1. With regard to the **elements** of the international application:*

☒ the international application as originally filed

☐ the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

☐ the claims:
pages _____, as originally filed
pages _____, as amended (together with any statement) under article 19
pages _____, filed with the demand
pages _____, filed with the letter of _____

☐ the drawings:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

☐ the sequence listing part of the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheet/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2 (c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item I and annexed to this report.*

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/SE00/01248

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-14	YES
	Claims		NO
Inventive step (IS)	Claims	1-14	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-14	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

Cited documents:

D1: WO 9424185 A1
D2: US 3875592 A
D3: US 4471496 A
D4: US 5023955 A

The documents cited in the International Search Report represent background art.

The invention defined in claims 1-14 is not disclosed by any of these documents.

None of the cited documents gives any indication towards the claimed method of producing a hood for a hearing protector. No relevant combination of the cited documents would lead a person skilled in the art to the invention defined in the claims.

Therefore, the invention defined in claims 1-14 is novel and is considered to involve an inventive step. It is also considered to be industrially applicable.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 00/01248

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: A61F 11/14, A42B 3/16
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: A61F, A42B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9424185 A1 (CABOT SAFETY CORPORATION), 27 October 1994 (27.10.94), claim 1, abstract --	1-14
A	US 3875592 A (JACKSON A. AILEO), 8 April 1975 (08.04.75), abstract --	1-14
A	US 4471496 A (ROSS GARDNER ET AL), 18 Sept 1984 (18.09.84), abstract --	1-14
A	US 5023955 A (JOHN A. MURPHY ET AL), 18 June 1991 (18.06.91), abstract -- --------	1-14

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
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"&" document member of the same patent family

Date of the actual completion of the international search
12 October 2000

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23 -10- 2000

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INTERNATIONAL SEARCH REPORT

Information on patent family members

01/08/00

International application No.
PCT/SE 00/01248

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